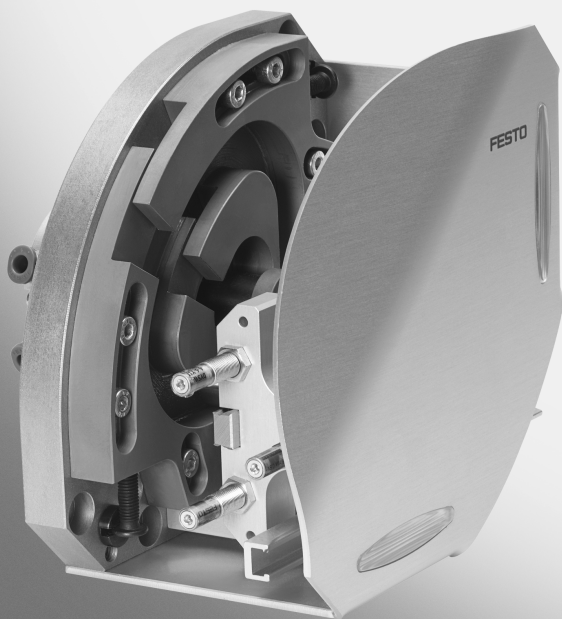


Handling module

HSW-...-AP/AS

FESTO

(en) Operating
instructions



8103887
2018-12c
[8103889]

Translation of the original instructions

Identification of hazards and instructions on how to prevent them:



Danger

Immediate dangers which can lead to death or serious injuries



Warning

Hazards that can cause death or serious injuries



Caution

Hazards that can cause minor injuries

Other symbols:



Note

Material damage or loss of function



Recommendations, tips, references to other documentation



Essential or useful accessories



Information on environmentally sound usage

Text designations:

- Activities that may be carried out in any order
- 1. Activities that should be carried out in the order stated
- General lists
- ➔ Result of an action/References to more detailed information

Handling module type HSW-...-AP/AS

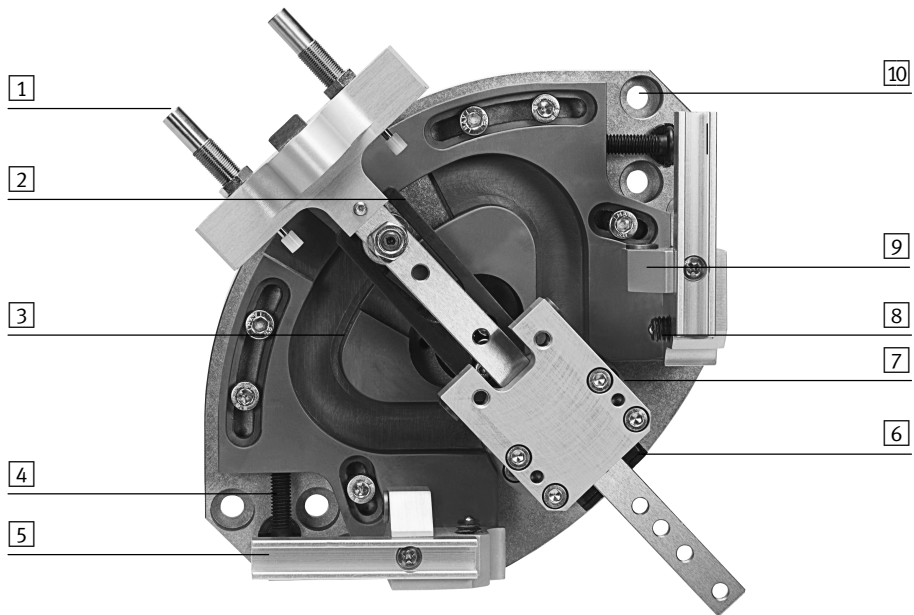
Contents

1	Operating elements and connections	4
2	Product overview	5
3	Function and application	7
4	Transport and storage	7
5	Conditions of use	8
6	Installation	9
	Mechanical installation	10
	Fitting the work load	11
	Fitting – static adjustment of the end positions	13
	Pneumatic installation	15
	Electrical installation	16
7	Commissioning	17
	Commissioning the complete system	17
	Commissioning test run	19
8	Operation	22
9	Care and maintenance	24
10	Dismantling and repairs	25
11	Accessories and combinations	27
12	Trouble-shooting	28
13	Technical specifications	29
14	Characteristic curves	31



For all available product documentation → www.festo.com/pk

1 Operating elements and connections



- | | |
|---|--|
| <p>1 Stop element for stroke setting:</p> <ul style="list-style-type: none"> – Hydraulic shock absorber/fixed stop in HSW-10-....AP/-AS – Stop screw in HSW-12/16-....AP <p>2 Swivel lever</p> <p>3 Link with path guide</p> <p>4 Adjusting screw for angle setting</p> <p>5 Groove for proximity switch SMx-8</p> | <p>6 Linear guide (guide carriage)</p> <p>7 Pivot bearing</p> <p>8 Spring clamping element</p> <p>9 End stop:</p> <ul style="list-style-type: none"> – Stop pin in HSW-10 – Hydraulic shock absorber/fixed stop in HSW-12/16-....AP/-AS <p>10 Sub-base with through holes and centring countersink for fastening screws</p> |
|---|--|

Fig. 1: Operating parts and connections HSW (front view)

2 Product overview

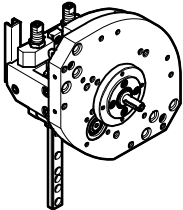
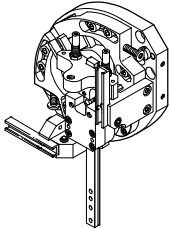
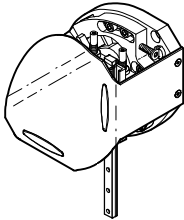
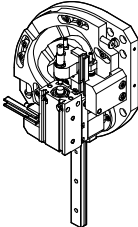
Basic design	Variants	
HSW-10, HSW-12, HSW-16 The handling module is supplied as standard in sizes 10, 12, 16 ready fitted with the following function elements: – Sub-base with variable fitting and fastening possibilities 10 – 2 adjustable guide links for path control via roller bearing guide 3 – 1 linear guide 6 – 1 pivot bearing – 2 stops in the end positions, each with a shock absorber (in HSW-...-AP) or rubber buffer (in HSW-...-AS) 1/ 9 and a fastening rail for proximity switch 5	HSW-...-AS Handling module without drive	
	HSW-...-AP Handling module with swivel module DSM (double-acting, pneumatic)	
Options		
HSW-...-SD Handling module with protective cover. The “SD” design is recommended for stand-alone mode.		
HSW-...-AW Handling module with cylinder BAW-HSW (also see chapter “Accessories”) for pushing the swivel lever back to a waiting position		

Fig. 2

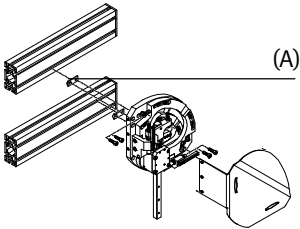
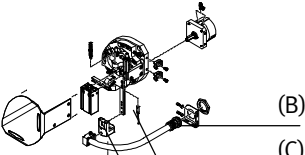
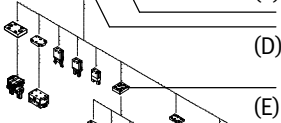
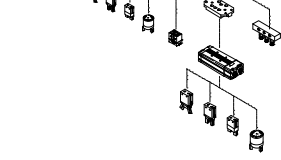
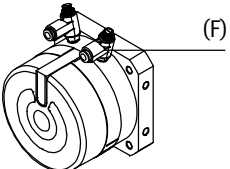
Kits and accessories (see also the chapters “Fitting” and “Accessories”)			
Item	Type	Instructions for use	
(A)	HMBN-8 HMBS	Slot nuts for fastening to profile columns	
(B)	MKRP	Installation kit: – Flexible protective tube for moving tubing – Cable strap to sub-base – Hose holder – Adapter bracket for fastening e.g. to sub-base or structure	
(C)	SME/SMT-8	Proximity sensor for end position sensing Proximity sensor for waiting position sensing (HSW-...-AW)	
(D) (E)	HAPG-69/-71 HAPG/HAPS	Adapter kit and if necessary additional adapter plates for fastening of add-on components (gripper, swivel drive). Instructions on fitting further accessories in conjunction with Festo components are summarized in the system manual “Handling technology”	
(F)	GRLA	For HSW-....AP: One-way flow control valves for setting the positioning speed	

Fig. 3

3 Function and application

By means of the path guide [3] and the linear guide [6] a movement in a vertical and horizontal direction is forced (y-z path). Spring clamping elements [8] fitted to the end stops [9] guarantee a high degree of repetition accuracy in positioning. Self-adjusting hydraulic shock absorbers [1] in the end positions cushion the movement. The end positions can be scanned with proximity switches SME/SMT-8. The switching status of the proximity switches can be observed through the viewing window when the protective cover is fitted on.

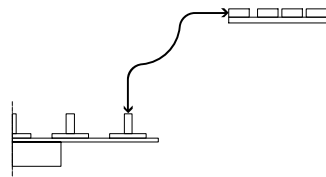


Fig. 4

The stroke range for both end positions (receive and release positions) is set separately depending on the installation position:

- via the adjusting screws for angle setting [4]
- via the shock absorbers/rubber buffers in the stop system [1].

Handling module HSW has been designed for use in automated component assembly in handling and fitting systems.

The HSW is particularly suitable for handling small parts at high speed, e.g. when inserting, turning over or joining.

4 Transport and storage

- Take the weight of the HSW into consideration.
Depending on the size, the basic design can weigh up to 5.5 kg.
- Consider the following recommendations regarding storage:

storage duration:	< 48 months
storage temperature:	+20 °C

5 Conditions of use



Please note

Incorrect handling can result in malfunctioning.

- Make sure that the specifications in this chapter are always observed.

The product will then function correctly and reliably.

- Please comply with national and local safety laws and regulations.
- Please observe the prevailing ambient conditions.
- Compare the maximum values specified in these operating instructions with your actual application (e.g. pressures, forces, torques, temperatures, masses, speeds).



- Remove the packaging.
The packaging is intended for recycling. (exception: oiled paper = non-recyclable waste).
- Please observe the warnings and instructions:
 - on the product
 - in these operating instructions, and
 - for HSW-...-AW: in the brief description for BAW-HSW
- Use the product without any unauthorized modifications.
- Make sure there is a supply of correctly prepared compressed air.

- Maintain the selected medium for the complete service life of the product.
Example: If non-lubricated compressed air is used at the beginning, you should always use non-lubricated compressed air.
- Slowly pressurize the complete system.
This will prevent uncontrolled movements from occurring. For slow start-up pressurization use on/off valve HEL.
- Check whether the following are required:

Air reservoir VZS	Non-return valve HGL
These will reduce fluctuations in the pressure.	In this way you can prevent the work load from sliding down if there is a sudden drop in pressure.

Fig. 5

6 Installation



Please note

- Note especially the following when fitting all the components:
 - ❑ Screw connections must be fitted free of offset and mechanical tension.
 - ❑ Screws must be fitted accurately (otherwise threads will be damaged).
 - ❑ The specified torques must be observed.
 - ❑ Contact surfaces must be clean (avoid leakage and contact faults).
- In the case of modules and components, also observe the fitting instructions supplied with the product.

Mechanical installation

The HSW is supplied ready for fitting.

- If necessary, remove the protective cover before fitting.
- Make sure that after fastening there is sufficient space for fitting the components.
- First fit the add-on components, and for HSW-....AS the external drive.
- Make sure that the fastening surface can support the weight of the HSW
- Fit the HSW only onto a flat fixed surface.
- Select one of the following fastening methods:
 - Direct fastening via the through holes and centring sleeves in the sub-base.

[mm]	HSW-10-...	HSW-12-...	HSW-16-...
H1 = L1	20	20	20
H2 = L2	56.5	80	100
H3 = L3	49	12.5	12
H4 = L4	20	20	20
H5 = L5	31	37.5	50
Ø D	5.5	5.5	5.5
Number of screws	Min. 2	Min. 4	Min. 4

Fig. 7

- Fastening to the rear of the sub-base with slot nuts HMBN-8 to profile columns HMBS (example: Fig. 8).

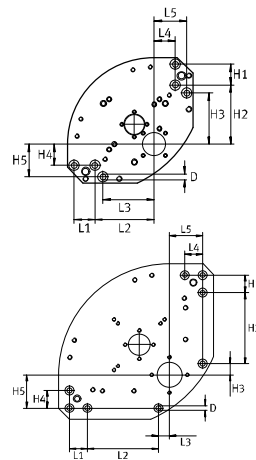


Fig. 6

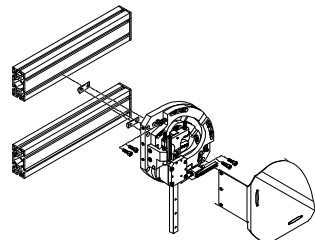


Fig. 8



Please note

- Note that two profile columns are necessary for stable fastening of the HSW-16.
- Place the HSW so that you can easily reach the operating parts.

- Please make sure of the following:
 - tension-free fitting.
 - sufficient space for connecting the supply cables and tubing.
- Tighten the fastening screws evenly.

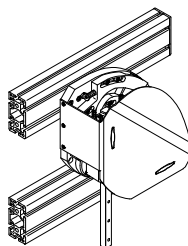


Fig. 9

Fitting the work load



Please note

- Take into account that the permissible work load is reduced by the mass of the add-on components (e.g. adapter kits).

Fitting the add-on components:

- Use the adapter kit HAPG-69...72 with:
 - Universal adapter for the relevant size of HSW (B).
 - Two channels for the tubing bearing (A) and the hole for the cable binder holder (C).

The standard hole pattern of the universal adapter (D) forms the interface to selected Festo products, e.g. grippers.

- Check to see if additional fastening elements and adapter kits are necessary (E).

An overview of this can be found in the sales documentation for the HSW.

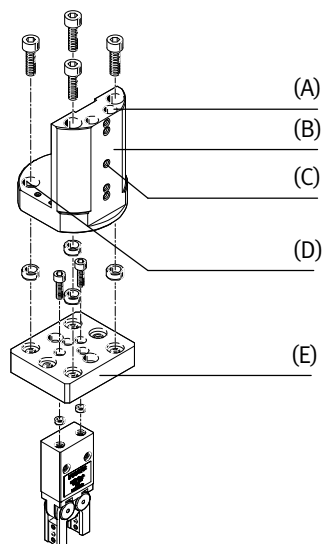


Fig. 10



Please note

Natural resonances when the work load vibrates can cause damage.

- Therefore place the mass moments of inertia of the work load as close as possible to the axes of symmetry of the linear guide and at the pivot point of the pivot bearing.



Please note

Excessive forces and torques can damage the drive and the mechanical components.

- Make sure that you observe the maximum permitted values of the following variables:
 - forces F_x , F_y , F_z
 - torques M_x , M_y and M_z

The reference point for forces and torques is the centre of the linear guide on the guide slide. See chapter “Technical specifications”.

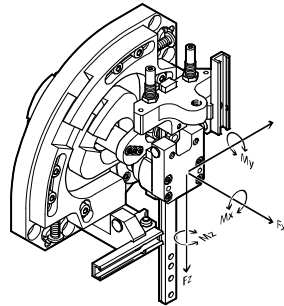


Fig. 11

Fitting an external drive for HSW-....AS:



Please note

- Use a drive with constant drive speed without impact loading.
- Make sure that you observe the maximum permitted values of the following variables:
 - axial and radial forces F_y and F_z
 - drive torque M_y

The reference point for forces and torques is the centre of the shaft. See chapter “Technical specifications”.

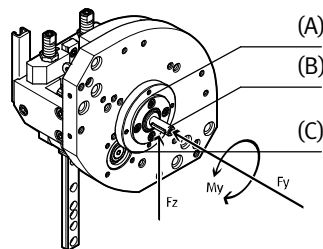


Fig. 12

The drive speed is transmitted via a drive shaft with ball bearings. The external drive can be fastened to the rear of the sub-base.

Fastening the drive	Tolerance	HSW-10-...	HSW-12-...	HSW-16-...
(A) Fastening holes	–	M3	M4	M4
(B) Shaft with feather key	g7	6 mm	8 mm	10 mm
(C) Centring fit	f8	32 mm	45 mm	50 mm

Fig. 13

Fitting – static adjustment of the end positions

For rough adjustment of the end positions:



Warning

Sudden movements of the actuators when they are under pressure during the setting of the link angle can cause injuries, and loose link parts can damage the HSW.

After setting the end positions:

- Make sure that the fastening screws of the link parts are screwed tight. In this way you will avoid injury to human beings and damage to the device.
 - Exhaust the drive before you loosen the fastening screws of the link parts.
 - Remove the protective cover of the handling module.
1. Loosen the fastening screws (A) of the right-hand and left-hand link parts [3] just enough to enable the link parts to be shifted.
 2. Turn the adjusting screws [4] until the link parts have reached the desired receive or release position.

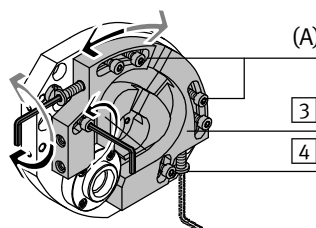


Fig. 14

Alignment free of offset:

3. Press the link parts **3** against the pivot bearing **7** while tightening the fastening screws of the link parts.

The tightening torque is:

- for HSW-10: 3 Nm
- for HSW-12/16: 6 Nm

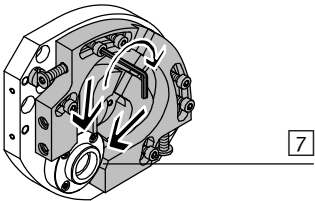


Fig. 15

For accurate adjustment of the end positions:

HSW-10-...	HSW-12/16-...
1. Loosen the locking nut of the shock absorber (A).	1. Loosen the locking nut of the stop screw (C).
2. Use an Allen wrench to turn the shock absorber (B) while at the same time applying counter force to the locking nut until the receive position is reached. (Note: shock absorber may only project in the range 1 ... 7 mm).	2. Use an Allen wrench to turn the stop screw (D) while at the same time applying counter force to the locking nut until the receive position is reached.
3. Tighten the locking nut (tightening torque: 0.4 Nm).	3. Tighten the locking nut: Tightening torque HSW-12: 1,2 Nm Tightening torque HSW-16: 2,0 Nm.
4. Repeat the procedure for setting the release position.	

Fig. 16

- Carry out a manual check of the following after each adjustment (without pressurizing the drive):
 - Has the desired end position been reached?
 - Are the link parts aligned without offset?
- In order to do this, swing the moveable mass into the end positions.
 - by hand or
 - on the drive using the hex socket (square in HSW-10; see Fig. 17).
- When doing this, check that the double rollers run smoothly in the path guide.
- If necessary, correct the alignment of the link parts.
- Fasten the protective cover of the handling module.

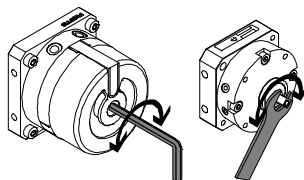


Fig. 17

Pneumatic installation

Connecting the drive for HSW-....AP:

- Use one-way flow control valves of GRLA for setting the swivel speed.
The speed will be reduced by the throttling of the exhaust air.
- Screw in both one-way flow control valves on the drive.
- Connect the tubing of the drive.

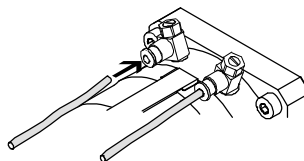


Fig. 18

Connecting the add-on components:

- Make sure that the moving pneumatic tubing and electric cables are laid correctly (example Fig. 19). Installation kit MKRP (see chapter “Accessories”) enables the tubing and cables to be grouped together in a flexible installation tube.

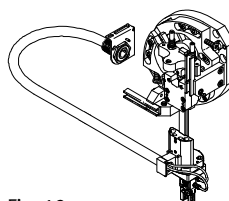


Fig. 19

Electrical installation

Using proximity switches SME/SMT-8 for scanning the end positions:

1. Remove the protective cover of the handling module.
2. Make sure that the shock absorbers are screwed in completely (as supplied from the factory in HSW-12/16).
3. Push the proximity switch into the groove of the sensor rail (A).
The electrical proximity switch is triggered by magnets in the stop screw (B) and in web (C) (in HSW-10).
4. Fasten the proximity switch in the end position. Subsequent adjustment of the shock absorbers is not necessary.
5. Fasten the protective cover of the handling module.

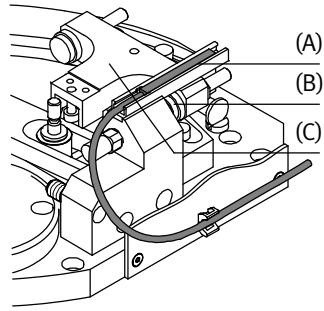


Fig. 20

Please note

The cables of the proximity switches must not lie in the working range of the handling module.

- Secure the cable using cable straps. Route the cable away to the side along the guide rail.

7 Commissioning

Commissioning the complete system

- Slowly pressurize the complete system. This will prevent uncontrolled movements from occurring.



Warning

- Make sure that:
 - no-one can reach into the traversing range/gripping range
 - there are no foreign objects in the traversing range/gripping range
 - there are no hose lines in the traversing range/gripping range.
- Protect the area e.g. by means of a cover or screen.

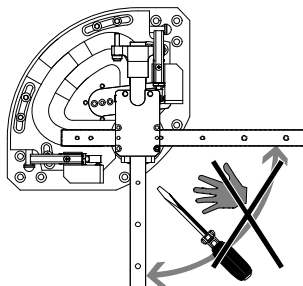


Fig. 21



Please note

The operating conditions for the setting procedure (operating pressure, ambient temperature) must be identical with those in continuous operation. Otherwise there is a danger of the handling module being overloaded.



Please note

For HSW-...-AP:

- Handle the shock absorber with care so that the thread, the piston rod and the outer cylinder are not damaged.
- Make sure that the shock absorbers are screwed in completely and locked (as supplied from the factory).

If the shock absorbers are not screwed in completely, the cushioning effect will be considerably reduced (reduced cushioning stroke).



Please note
For HSW-...-AS with electric motor:
Movement to a fixed stop creates impulsive loadings in the drive train. This can cause damage to the gears, for example.

- Always use reduced energy during reference runs to the fixed stops (1/ 9 in Fig. 1).

The rubber buffers in the fixed stops are only for silencing.



Please note
For HSW-...-...W:

- Please observe the warnings and instructions in the brief description for BAW-HSW.

- Pressurize the add-on components.
- If necessary, carry out a separate test run to check that the add-on components are functioning correctly.

Attachment components	Tests
Without work load	– Check the correct assignment of the compressed air connections – Gripping speed – Function of the proximity switches
With load	– Check that the work load is gripped firmly

Fig. 22

- Pressurize the drive in one of the following ways as desired:
 - slow pressurization of one side
 - simultaneous pressurization of both sides with subsequent exhausting of one side



Please note
The swivel module DSM for HSW-...-AP may only be operated unmodified as supplied from the factory and with the protective cap (if present).



Please note

- Start first of all a test run at reduced operating speed.
- Accelerate in steps until the operating speed is reached.

Please refer to the calculations for your application for the speed required.

- Interrupt the test run if:
 - there is an audible metallic knocking of the stop screws
 - the double rollers do not run smoothly in the path guide
 - the end positions are not reached
 - the work load falls down.
- Note the instructions for troubleshooting in chapter 12.

Commissioning test run

1. Tighten the two upstream one-way flow control valves:
 - at first completely
 - then loosen approximately one turn.
2. Make sure that the operating conditions lie within the permitted ranges.

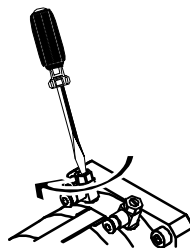


Fig. 23



Please note

The permitted kinetic impact force at the end stop applies for certain mass-speed combinations. It must not be exceeded.

- Make sure that the permitted values for the positioning time as a factor of the work load are observed (chapter "Characteristic curves").

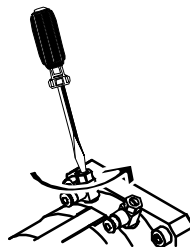


Fig. 24

3. During the test run check:
 - that the proximity switches are functioning correctly
 - that the work load is held safely
 - the positioning time as a factor of the work load
 - the adjustment of the end positions.
4. When adjusting the end positions, observe the instructions in the chapter “Fitting”.

**Warning**

Sudden movements of the actuators when they are under pressure during the setting of the link angle can cause injuries, and loose link parts can damage the HSW

- Exhaust the drive before you loosen the fastening screws of the link parts.

After setting the link angle:

- Make sure that the fastening screws of the link parts are screwed tight. In this way you will avoid injury to human beings and damage to the device (tightening torque: see “Mechanical installation”).

5. Open up the one-way flow control valves slowly again until the desired positioning speed is reached.
6. Make sure that the pulse time does not drop below the minimum permitted time.

Definition

Pulse time t_t = positioning time t + dwell time t_e

t : Time which the HSW requires in order to move from the receive position to the release position and back (for permissible values see chapter “Characteristic curves”).

t_e : Time during which the HSW remains in the receive position and release position.

Type	HSW-10-...	HSW-12-...	HSW-16-...
Minimum permitted pulse time t_t [s]	0.6	0.8	1

Fig. 25

The HSW should reach the end position safely, but not strike hard against it. Striking too hard causes the device to bounce back out of the end stop.



Please note

The tendency to vibrate increases if the speed at the start of cushioning is high. The complete cycle time increases due to the reverberation time.

- Set the drive below the max. permitted speed at the start of cushioning. You can then increase the end position accuracy.

When all corrections have been undertaken:



Please note

Before exhausting:

- Make sure that the gripper is not holding a work load.

In this way you can prevent a mass from sliding down when the device is exhausted.

7. End the test run. Exhaust the drive and the add-on components.

8 Operation



Warning

- Make sure that:
 - no-one can reach into the traversing range/gripping range
 - there are no foreign objects in the traversing range/gripping range.
 - there are no hose lines in the traversing range/gripping range.
- Protect the area e.g. by means of a cover or screen.

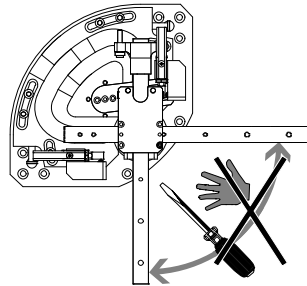


Fig. 26

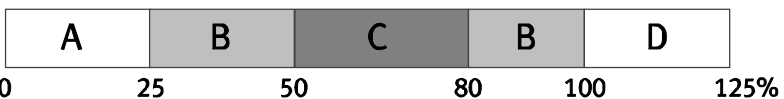


Please note

If the shock absorber is not used to its full extent, there will be an increase in the oil leakage.

- Make sure that the shock absorber is operated with an energy utilization of at least 25 % to max. 100 %.

The recommended range lies between 50 and 80 %.



A = disadvantageous; B = permissible; C = optimal; D = impermissible

Fig. 27

- Take into account the fact that the viscosity of the hydraulic oil diminishes during operation due to the friction warmth which arises.

The shock absorber can therefore break through after a long period of operation.

At temperatures around 0 °C:

- Note that the resetting times of the shock absorber become longer.
Low temperatures cause an increase in the viscosity of the hydraulic oil.
The HSW should always reach the end position safely, but not strike hard against it.
- Check the cushioning elements and spring clamping elements (type designation see “Accessories”) for the following signs of wear:



Testing	Spring clamping element [8]	Shock absorber [1]
Test cycle	Every 2 million strokes (approx. every 2 months) *)	Every 2 million strokes (approx. every 2 months) *)
Signs of wear	Play of the guide rail in the end positions (in the area of the linear motion)	Oil leakage; hard knocking; stop plunger remains in the retracted end position or moves away from it only hesitantly.
Replacement cycle	After 5 million switching cycles	Every 10 million strokes (approx. 1 year) *)
*) At 0.5 Hz in dual operation mode		

- Check to see if more frequent tests are required. This may be the case with:
 - high temperatures,
 - excessive dirt,
 - when there are fats solvent fluids or fumes in the vicinity.



Please note

In case of changing loads:

- Repeat the procedure taking into account the changed work load:
 - end position adjustment (chapter “Fitting”).
 - the setting of the positioning speed (chapter “Commissioning”).

9 Care and maintenance

- If the HSW is dirty, clean the exterior with a soft cloth.

If the HSW is defective or if the drive on the HSW-...-AP is defective:

- Send the HSW to Festo for repairs.

Lubrication

- Grease the surfaces of the roller bearing guide which do not have a layer of grease (e.g. after cleaning) in accordance with the following table:

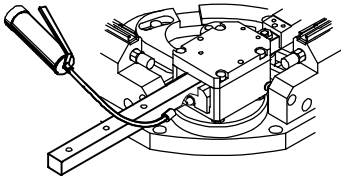
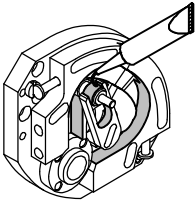
Component	Guide rail (HSW-10/12)/ Nipple (HSW-16)	Link track and swivel lever
Lubrication point		
Lubrication interval	Every 10 million switching cycles	
Lubrication procedure	Swing the moveable mass into the end positions – by hand or – with hex socket (square in HSW-10) on the drive (Fig. 17)	
Lubricating grease	LUB-KC1	

Fig. 28

10 Dismantling and repairs

Replacing the spring clamping elements



Please note

Use only original parts from Festo when replacing the spring clamping elements.

1. Exhaust the drive.
2. Move the linear guide into the mid-position.
3. Use an Allen wrench to unscrew the old clamping element.
4. Move the linear guide into the end position.
5. Screw in the new clamping element until it just touches the stop pin of the rotary unit.
6. Then tighten the clamping element with another 1/2 turn (pre-tension 0.5 mm). The guide rail is then free of play.

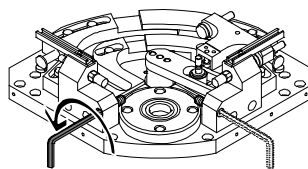


Fig. 29



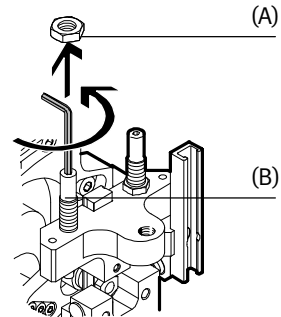
Please note

The specified pre-tension of the spring clamping element is sufficient for play-free guidance. Avoid unnecessary wear on the linear guide and links due to excessive pressing force.

Replacing the shock absorbers:

1. Exhaust the drive.
2. Remove the protective cover.
3. Remove the proximity switch and the sensor rail on the shock absorber holder (only in HSW-12/16).
4. Loosen the locking nut (A) (only in HSW-10).
5. Unscrew the old shock absorber (B) (in HSW-12/16 with the stop sleeve; a spanner flat is available on the thread of the shock absorber).
6. Screw the new shock absorber in again (for tightening torque see table).
7. Tighten the locking nut (only in HSW-10; for tightening torque see table).
8. Fasten the sensor rail (only in HSW-12/16).
9. Push the proximity switch into the groove of the sensor rail.
10. Fasten the proximity switch in the end position.
11. Fasten the protective cover.

HSW-10



HSW-12/16

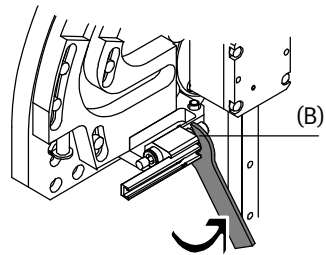


Fig. 30

Permissible tightening torque	HSW-10 (DYSW-4-6-Y1F)	HSW-12 (DYSW-5-8-Y1F)	HSW-16 (DYSW-7-10-Y1F)
– Locking nut (HSW-10)	0.4 Nm	2 Nm	3 Nm
– Shock absorber (HSW-12/16)			

Fig. 31

- Reduce the amount of waste by using the materials in the shock absorber for other purposes (material recycling).

The shock absorber is filled with hydraulic oil.

11 Accessories and combinations

Designation	Type
Cover kit	BSD-HSW
Installation kit	MKRP
Adapter kit	HAPG
Waiting position	BAW-HSW
Shock absorber	DYSW-...-Y1F
Spring clamping element	Original spare part for HSW
Centring sleeve	ZBH
Proximity switch	SME-8-K(S)-LED-24 SMT-8-PS(NS)-K(S)-LED-24-B
On-off valve	HEL
One-way flow control valve (restricted exhaust)	GRLA

Fig. 32



Instructions on fitting further accessories in conjunction with Festo components are described in the chapter “Handling technology” in the system manual.

12 Trouble-shooting

Fault	Possible cause	Remedy
Hard knocking in stroke end position	Shock absorber defective	Replace shock absorber
	Stop element overloaded: – Work load too heavy – Speed of the moveable mass too high	Reduce positioning speed
Faults in position scanning	Position of proximity switches incorrect	Correct position of proximity switches
	Incorrect proximity switch type fitted	Use only proximity switches SME/SMT-8
	Proximity switch defective	Replace proximity switch
	Ferritic parts in the vicinity of the proximity switch	Use parts made of non-magnetic materials
End positions not reached	Setting of the stroke angle and the z-stroke not correct	Adjust end positions (see chapter “Fitting – static adjustment of the end positions”)
The double rollers do not run smoothly in the path guide	Link parts offset	Align link parts so there is no offset (see chapter “Fitting – static adjustment of the end positions”)
Play of the guide rail in the end positions	Spring clamping element defective	Replace spring clamping element

Fig. 33

13 Technical specifications

Type			HSW-10	HSW-12	HSW-16
Model	HSW		Handling module		
	HSW-...-AP		– with pneumatic swivel drive (double-acting swing wing)		
	HSW-...-AS		– without drive		
	HSW-...-AW		– with aktive waiting position		
	HSW-...-SD		– with protective cover		
Installation position			As desired (vertical operation preferred)		
Medium			Filtered, lubricated or non-lubricated compressed air (grade of filtration min. 40 µm)		
Permissible operating pressure	HSW-...-AP	[bar]	4 ... 8		
Pneumatic connection			M3	M5	M5
Permitted temperature range			[°C] 0 ... +60		
Lubrication			Linear guide with service life lubrication, re-lubrication recommended after 10 million strokes.		
End position adjustment			Adjusting screws for angle stroke range Stop screws in working stroke direction		
End-position cushioning	HSW-...-AP		With shock absorber		
	HSW-...-AS		With rubber buffer (only for silencing)		
Permitted shock absorber energy					
– E _{max}	HSW-...-AP	[Nm]	0.8	1	2
– E _{hmax}	HSW-...-AP	[Nm]	2	10	15
Min. permissible pulse time Pulse time t _t = positioning time t + dwell time t _e (definition see chapter 7)			0.6	0.8	1

Type		HSW-10	HSW-12	HSW-16	
Stroke ranges					
– Working stroke	[mm]	9 ... 15	15 ... 25	20 ... 35	
– Angle stroke range	[°]	80 ... 100	80 ... 100	80 ... 100	
Max. permitted loading values of the guide					
– Dynamic torque M_{per} with vertical operation and observing the maximum work load *)	[Nm]	0.6	1.5	2.5	
– Combined load		$M_x/M_{per} + M_y/M_{per} + M_z/M_{per} < 1$			
– Static torque $M_{o\ per}^{*)}$ in vertical operation for press-fit and joining procedures without dynamic loading	[Nm]	$M_{oxper} = 3$	$M_{oxper} = 8$	$M_{oxper} = 16$	
	[Nm]	$M_{oyper} = 2.6$	$M_{oyper} = 8$	$M_{oyper} = 20$	
	[Nm]	$M_{ozper} = 3.5$	$M_{ozper} = 12$	$M_{ozper} = 25$	
– Combined load		$M_x/M_{ox\ per} + M_y/M_{oy\ per} + M_z/M_{oz\ per} < 1$			
*) The torques apply to the centre of the guide carriage					
Max. permitted loading with external drive					
Axial force on drive shaft	F_{Yper}	[N]	10	18	30
Radial force on drive shaft	F_{Zper}	[N]	30	45	75
Drive torque	M_{Yper}	[Nm]	0.85	1.25	2.5
Repetition accuracy	[mm]	±0.02			
Vibration		Tested according to DIN/IEC 68/EN 60068 Part 2-6: severity class 2			
Shock		Tested according to DIN/IEC 68/EN 60068 Part 2-27: severity class 2			

Type			HSW-10	HSW-12	HSW-16
Materials HSW					
– Sub-base, holder, web, sensor rail, protective cover:			Al wrought alloy, anodised		
– Link, swivel lever:			Case-hardened steel		
– Linear guide:			Tempered steel		
– Adjusting screw, stops, spring clamping element:			High-alloy steel		
Materials: HSW-...-AS					
– Shaft:			Steel		
– Bearing:			Al wrought alloy		
– Ball bearings:			Rolled steel		
Weight (approx.)	HSW-...-AP	[kg]	1.3	3.0	5.4
	HSW-...-AS	[kg]	1.2	2.8	5.2
	HSW-...-SD	[kg]	0.1	0.2	0.3
	HSW-...-AW	[kg]	0.07	0.2	0.4

Fig. 34

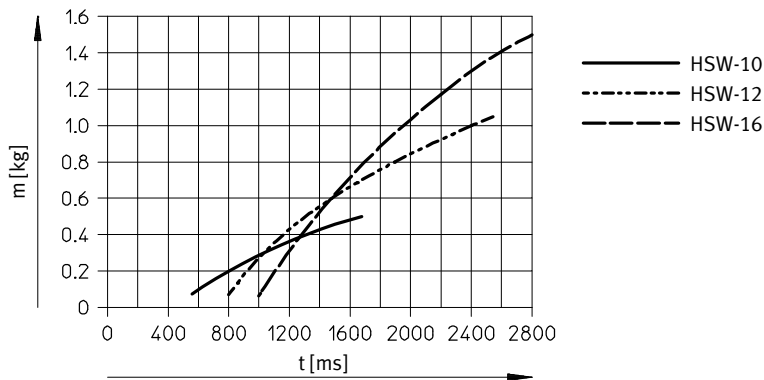
14 Characteristic curves

Definition

Work load m = Additional mass on the vertical guide rail, e.g. adapter, swivel drive, gripper and work item.

Positioning time t = Time which the HSW requires in order to move from the receive position to the release position and back again.

a) Positioning time t [ms] as a function of the work load m [kg]



b) Mass moment of inertia J [kgcm²] as a function of the work load m [kg] (for drive design)

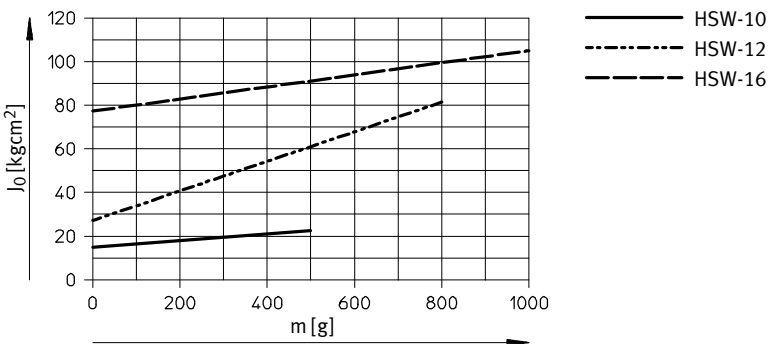


Fig. 35

Copyright:
Festo SE & Co. KG
Ruiter Straße 82
73734 Esslingen
Germany

Phone:
+49 711 347-0

Fax:
+49 711 347-2144

E-mail:
service_international@festo.com

Internet:
www.festo.com

Reproduction, distribution or sale of this document or communication of its contents to others without express authorization is prohibited. Offenders will be liable for damages. All rights reserved in the event that a patent, utility model or design patent is registered.